49. (Added) The display device of claim 38 in which the ambient light diffuser includes a transmissive ambient light diffuser through which ambient light passes.

Remarks

Claims 28-49 are in the application. Claims 28, 34, and 38 are in independent form. Claims 1-5, 7, 11, 13, 20, and 23-27 have been cancelled. Reconsideration is requested.

The Examiner cites guidelines relating to the abstract of the disclosure. Applicants have amended the Abstract in accordance with the guidelines.

Claims 1-5, 7, 11, 13, 20, and 23-25 stand rejected under 35 U S.C. 102(b) for anticipation over Helms (US Patent No. 5,760,760). The claims have been cancelled and replaced by added claims 28-44 and 49. Applicants believe the added claims are patentably distinct from the cited reference for the following reasons.

Added claim 28 recites a method of controlling backlight illumination of a transmissive display device. Ambient light is received at an ambient light diffuser and directed as diffuse ambient light toward a rear surface of the transmissive display panel. The rear surface of the transmissive display panel is illuminated with a powered backlight simultaneously while the diffuse ambient light is directed toward the rear surface of the transmissive display panel. The illumination of the rear surface of the transmissive display panel with the powered backlight is controlled according to a detected amount of ambient light.

Applicants submit that the cited reference does not teach or suggest such a display device with illumination of a display panel with ambient light and a backlight simultaneously, as recited in the claim. Helms describes a brightness control system for an LCD panel that is illuminated solely by a backlight. Helms provides no teaching or suggestion of controlling the backlight portion of illumination light in accordance with detected ambient light. The present

invention allows use of ambient light to illuminate a transmissive display to reduce power used by a backlight. In contrast, the system of Helms would be expected to increase backlight power under some ambient light conditions. Applicants believe, therefore, that claim 28 is patentably distinct from the cited references.

Added independent claim 38 recites a transmissive display device that generally corresponds to the method of claim 28. Also, added independent claim 34 recites a method that explicitly recites minimizing the illumination of the rear surface of the transmissive display panel with the powered backlight. Applicants believe independent claims 28, 34, and 38 are in condition for allowance and respectfully request the same.

Applicants believe that dependent claims 29-33, 35-37, and 39-49 are allowable as dependents of independent claims 28, 34, and 38. Applicants believe that claims are further allowable for the following reasons.

Claims 30, 31, 36, 37, 40, and 41 recite detecting the amount of ambient light at about the light-receiving rear side of the display panel. The Examiner cites Helms as disclosing a rear photo-sensor at column 5, lines 12-19. Applicants note, however, that the photodetector 410 of Helms is shown in Fig. 4 and described at column 5, lines 8- 11, as being positioned on the outside rear of the LCD case and detecting light directed toward a user's eyes. Helms provides no teaching or suggestion of detecting the amount of ambient light at about the light-receiving rear side of the display panel. Indeed, the detection of photodetector 410 of Helms is directed in the opposite direction of the detection recited in the claims. Applicants believe, therefore, that claims 30, 31, 36, 37, 40, and 41 are allowable.

Claims 33, 34, and 43 recite that controlling the illumination of the rear surface of the transmissive display panel with the powered backlight includes minimizing power delivered to the powered backlight to achieve the user selected

brightness level. Such minimization can be achieved because the transmissive display panel is illuminated from the rear by a backlight and ambient light. In contrast, Helms provides no basis for transmissive illumination with ambient light and hence no basis for minimizing power delivered to a backlight to achieve the user selected brightness level. Applicants believe, therefore, that claims 33, 34, and 43 are allowable.

Claims 26 and 27 stand rejected under 35 U S.C. 102(b) for anticipation over Helms (US Patent No. 5,760,760) in view of Selker (US Patent No. 5,777,704). The claims have been cancelled and replaced by added claims 45-48. Applicants believe the added claims are patentably distinct from the cited reference for the following reasons.

Claims 45-48 depend from claim 38, which applicants believe to be patentably distinct from Helms for the reasons set forth above. Selker and Helms together do not teach or suggest the subject matter of claim 38 or any of its dependent claims.

In addition, claim 46 recites a pivotal coupling between the diffuser and a top edge of the display panel. Neither of the cited references teaches or suggests such an arrangement between a diffuser and a display panel. Selker describes a system in which an artificial light source and diffuser 205 pivots in fixed relation to a reflective surface 203 and relative to a bottom edge of an LCD. There is no indication of providing a pivotal coupling between a diffuser and a top edge of a display panel as recited in claim 46.

Applicants believe, therefore, that claims 45-48 are in condition for allowance and respectfully request the same.

Claims 26 and 27 are provisionally rejected for obviousness-type double patenting over claims 1 and 16 of copending application No. 09/299,521. Applicants traverse the provisional rejection for the following reasons.

Claims 26 and 27 have been cancelled and replaced by claims 45-48, which depend from claim 38. Claim 38 recites a transmissive display device with a backlight intensity control circuit for controlling the intensity of the backlight according to a detected amount of at about at least one of the front and rear sides of the display panel. Accordingly, claims 45-48 each include such a backlight intensity control circuit, which is not included in any of the claims of copending application No. 09/299,521. Applicants submit, therefore, that the claims of the present application are patentably distinct from the claims of copending application No. 09/299,521 and request, therefore, that this provisional rejection be withdrawn.

Applicant believes the application is in condition for allowance and respectfully requests the same.

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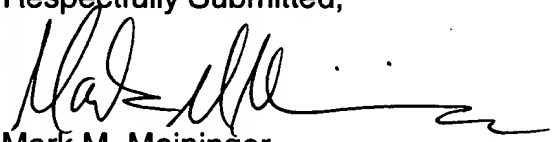
Respectfully Submitted,



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Attachment
Application Number: 09/299,522

Abstract:

(Amended) Energy efficient transmissive and transreflective display devices [are described. Ambient] use ambient light from a natural or artificial source [is used] to [replace and/or] supplement light [normally] supplied by a backlight. [This is done by directing ambient light to the rear of a transmissive display panel. A window, light tunnel, or a reflective surface located in the rear or top of a display device may be used to direct the ambient light to the back of the display panel.] [A translucent] Ambient light passes through a transmissive diffuser [and/or diffuse reflector are used to diffuse the ambient light to reduce the chance of bright spots appearing on the display.] to a rear surface of a transmissive display panel. Additional energy efficiency is achieved by using one or more photo-sensors to detect the amount of ambient light[, incident on the front and/or rear of a display panel and by] and automatically adjusting the backlight intensity as a function of photo-sensor output. [In this manner] As a result, backlight intensity and power usage can be minimized while maintaining the viewability of images shown on the display. [In such an embodiment, energy savings are achieved as compared to devices which use fixed backlight intensity settings in a variety of light conditions. Control of the power supplied to a display's backlight in accordance with the present invention can reduce electrical energy consumption and prolong the amount of time a portable device can be used before its batteries need to be recharged.]